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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,652	08/07/2003	Keizo Ohta	723-1414	8790

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EXAMINER	
MCCULLOCH JR, WILLIAM H	

ART UNIT	PAPER NUMBER
3714	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/635,652	OHTA, KEIZO	
	Examiner	Art Unit	
	William H. McCulloch	3714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to a reply received 5/5/2008. Claims 1-10 are pending in the application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bilodeau et al. (US 6,384,822 B1) in view of Higashiyama (US 2002/0036638 A1). This rejection was made in a previous Office Action and is maintained and incorporated herein.

Regarding claims 1 and 6-7, Bilodeau discloses game device, method, and computer-readable storage medium for storing a shadow volume generation program that causes a computer to generate a shadow volume used for rendering a shadow cast by an object placed in a three-dimensional virtual space, wherein the shadow volume generation program causes the computer to execute the steps of writing a Z value corresponding to each pixel within a predetermined area including at least the shadow casting object, into a Z-buffer (col.1, lines 35-38, 50-51), using a light source placed in the virtual space and generating a shadow volume using a plurality of polygons with regard to a direction perpendicular to a surface of the plane object in accordance with the Z value of each pixel written in the Z-buffer (col. 2, lines 21-35), the Z value of each

pixel written in the Z-buffer being unchanged during shadow volume generation (col. 2, lines 35-40).

Bilodeau does not specifically disclose using a light source placed in the virtual space as a view point and generating the shadow volume from a plane object by determining a position of each vertex of a plurality of polygons composing the plane object. However, in an analogous shadow volume generation invention, Higashiyama discloses generating the shadow volume from a plane object by determining a position of each vertex of a plurality of polygons composing the plane object (par. 36). Higashiyama expresses to one of ordinary skill in the art that the virtual camera could be moved to any orientation desired, including the location of the light source, at least by the teachings in paragraphs 2 and 7. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Bilodeau and Higashiyama as Bilodeau discloses maintaining location information for polygons composing a plane object (Fig. 2, P1, P2, P3; col. 2, lines 49-67). Further, all of the claimed elements were known at the time of the invention and one of ordinary skill in the art could have combined the elements using known methods with no change in their respective functions and the combination would have yielded predictable results to one of ordinary skill in the art.

4. Claims 2-5 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bilodeau et al. (US 6,384,822 B1) in view of Higashiyama (US 2002/0036638 A1) as applied above, and further in view of Matsumoto (US 5,043,922). This rejection was made in a previous Office Action and is maintained and incorporated herein.

Regarding claim 2, Bilodeau/Higashiyama disclose the shadow volume generation technique as described above. Further, Bilodeau teaches of a plane object composed of a plurality of polygons, each polygon having a combination of an X, Y and Z coordinate (Fig.2). *Bilodeau/Higashiyama do not specifically disclose a shape of the plane object is defined by a plurality of vertices, each having different combination of an X-coordinate and a Z-coordinate, and in the shadow volume generation step, a Y-coordinate of each vertex of the plane object is determined in accordance with the Z value of each pixel written in the Z-buffer.* However, Matsumoto teaches the element of a shape of the plane object is defined by a plurality of vertices, each having different combination of an X-coordinate and a Z-coordinate (Matsumoto, col. 7, lines 26-56), and in the shadow volume generation step, a Y-coordinate of each vertex of the plane object is determined in accordance with the Z value of each pixel written in the Z-buffer (Matsumoto, col. 7, lines 9-56). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the elements disclosed by Bilodeau, Higashiyama and Matsumoto as all inventions are in the shadow volume generation field of endeavor. Further, all of the claimed elements were known at the time of the invention and one of ordinary skill in the art could have combined the elements using known methods with no change in their respective functions and the combination would have yielded predictable results to one of ordinary skill in the art.

Regarding claim 3, Matsumoto discloses the light source is a point light source (col. 12, lines 24-57 or col. 5, line 20), and the shadow volume generation step includes a step of determining a position of each vertex of the plane object with regard to a

direction parallel to a surface thereof in accordance with the Z value of each pixel written in the Z-buffer (col. 12, lines 24-57).

Regarding claim 4, Matsumoto discloses a shape of the plane object is defined by a plurality of vertices, each having a different combination of an X-coordinate and a Z-coordinate (col. 7, lines 9-55), and in the shadow volume generation step, the X-coordinate and the Z-coordinate of each vertex of the plane object are determined in accordance with the Z value of each pixel written in the Z buffer (col. 7, lines 9-55).

Regarding claim 5, Matsumoto discloses the storage medium according to claim 1, wherein the shadow volume generation program further causes the computer to execute the steps of placing the shadow volume generated at the shadow volume generation step in the virtual space in a virtual manner so that a height direction of the shadow volume Coincides with a direction of light emitted from the light source (col. 7, line 40- col. 8, line 13), and rendering the shadow of the shadow casting object using the shadow volume placed in a virtual manner (col. 7, line 40 - col. 8, line 30).

Regarding claims 8-10, Matsumoto discloses the ability to generate shadow volumes for models that have missing faces or “holes”, as shown in Fig. 2(b), Fig. 3 and Fig. 4, and thus has the ability to reduce exception case handling.

Response to Arguments

5. Applicant's arguments filed 5/5/2008 have been fully considered but they are not persuasive.

Applicant contends on pages 2-3 of the Remarks that Bilodeau and Higashiyama fail to teach “using a light source placed in the virtual space as a viewpoint”. Applicant

first argues that the reference V in Figure 4 of Higashiyama is indicative of only a light source, and not a viewpoint. The Examiner agrees that reference V is the light source, and submits that V is not *necessarily* the viewpoint. As Applicant correctly points out, Higashiyama's discussion of front-facing and rear-facing polygons suggests that the viewpoint (at least in Fig. 4) is actually where a person reading the published application is located. However, the fact that the illustration in Figure 4 has a light source independent of the viewpoint does not mean that Higashiyama's invention fails to teach using a light source placed in the virtual space as a viewpoint. Indeed, the reference recognizes in at least par. 7 that the invention is directed toward a "3D image processing program and a video game system". The reference further recognizes that known video games "simulate car race, skiing, surfing, motor-[boating], snow boarding, skate boarding, etc." (par. 2). The salient feature of these teachings is that the three-dimensional (3D) environment is clearly intended to allow the viewpoint of the virtual camera to move in the course of game play, as is well known in the above video game simulations. As such, Higashiyama expresses to one of ordinary skill in the art that the virtual camera could be moved to any orientation desired, including the location of the light source, which renders such claimed feature unpatentable over the cited prior art.

In addition to the above, Applicant contends on page 4 that in Matsumoto, "an object is written in the Z-buffer by using the light source as a viewpoint (hidden-surface removal) [*sic*] just to determine to which part of which edge of an object light is cast." By this statement, Applicant has clearly admitted that Matsumoto teaches "using a light source placed in the virtual space as a viewpoint". Therefore, even assuming *arguendo*

that the other references did not teach using the light source as a viewpoint, Applicant has admitted that Matsumoto does. Therefore, the combination of Bilodeau, Higashiyama, and Matsumoto teaches all features of claims 1 and 6-7, in addition to the features of 2-5 and 8-10.

On pages 4-5, Applicant contends that Matsumoto fails to teach a '*reduced* amount of exception case handling.' First, the Examiner notes that claims 8 and 10 recite performing certain operations, wherein the outcome "reduces exception case handling" (claim 9 recites "to reduce exception case handling"). The recitations "to reduce exception case handling" and "reduces exception case handling" are intended use recitations. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Second, Applicant appears to argue that because Matsumoto detects exception case handling, Matsumoto somehow fails to reduce it. However, there is no clear standard in the claims or specification to suggest how much of a reduction is provided by Applicant's invention, nor could it be considered a patentable feature because there is no structural difference implied (see above).

Third, Applicant seems to assume that the standard for obviating or anticipating the claimed invention is that the prior art must teach *eliminating* exception case handling, but this is clearly contrary to the plain language of the claimed and disclosed invention.

Finally, Applicant contends that "In marked contrast to Matsumoto, the invention of claims 8-10 involves determining a position of each vertex of a plurality of polygons composing the plane object to define the shadow volume through the use of a Z-buffer" (p. 5). As was described in the previous Office Action, Higashiyama discloses generating the shadow volume from a plane object by determining a position of each vertex of a plurality of polygons composing the plane object (see at least par. 36). In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In view of the above explanations, the previous grounds of rejection are deemed proper.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William H. McCulloch whose telephone number is (571) 272-2818. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert E. Pezzuto can be reached on (571) 272-6996. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/W. H. M./
Examiner, Art Unit 3714
9/9/2008

/Corbett Coburn/
Primary Examiner
AU 3714